JOURNAL OF APPLIED BEHAVIOR ANALYSIS 1991, 24, 337–347 NUMBER 2 (SUMMER 1991)

EFFECTS OF CONTEXTUAL COMPETENCE ON SOCIAL INITIATIONS

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The frequency of social initiations and satisfaction with interactions in three dyads, each consisting of 1 student with disabilities and 1 nondisabled peer, were assessed under two alternating conditions: Condition 1 assessed the interactions around a set of four trained computer games, and Condition 2 assessed interactions when students were playing a set of four untrained computer games. Training was conducted with a multiple baseline design across participants and was followed by social interaction probes using an alternating treatments design. The results indicated greater frequencies of social initiations by 5 of 6 participants, higher degrees of game satisfaction by all participants, and equal or higher degrees of peer satisfaction by 5 of 6 participants when playing trained games in comparison to untrained games.

DESCRIPTORS: social initiation, contextual effects, computer games, students with moderate disabilities, peers

The creation of a support technology for social interactions and social relationships is emerging as a central purpose of programs for persons with disabilities (Brown et al., 1989; Haring & Breen, 1989; Sailor et al., 1989). The analysis of social and physical contextual characteristics may be an important component of this technology. For example, some social interactions and contexts (e.g., play) may be more engaging, whereas other interactions (e.g., discrete-trial instruction) can be unpleasant or uninteresting. Analysis of social contexts to identify those that increase positive peer interactions would be an important contribution to this emerging technology. The purpose of the present study was to investigate one variable of potential importance to understanding social contextual control of behavior: the competent behavior of interactants within the social context.

Socially competent behavior can be defined as "those responses which, within a given situation, prove effective or, in other words, maximize the probability of producing, maintaining, or enhancing positive effects for the interactor" (Foster & Ritchey, 1979, p. 626). For the purposes of this research, socially competent behavior included the independent production of a repeated sequence of motor responses following a repeated sequence of computer generated visual stimuli. In the present study, we compared social initiations and satisfaction with interactions between adolescents with and without disabilities in a social leisure context under two conditions. In one condition, the dyad played a set of microcomputer games that the student with disabilities had been trained to play with competence, whereas in the second condition, the dyad played a set of games that had not been taught to the student with disabilities. There was no direct intervention on social interaction skills.

METHOD

Participants

Participants included 3 students, ages 13 and 14, with moderate disabilities attending a special education classroom on an integrated junior high school campus and 3 students of the same age

This research was supported by the U.S. Department of Education, Office of Special Education and Rehabilitation Services, Programs for Severely Handicapped Children and Youth, Nondirected Research Grant H086-C-30421. The opinions expressed herein do not necessarily reflect the position or policy of the Office of Special Education; an official endorsement should not be inferred. This study was conducted by the Social Context Research Project. We would like to thank our Project Officer, Ann Smith, for her ongoing support of the project. We also thank Laurie Yarnell and Deanna Bernstein in whose classrooms the research was conducted and Dr. Robert Bowen, Principal of La Colina Junior High School.

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without disabilities. The 3 participants with disabilities were selected because they displayed low levels of social interaction in dyadic contexts and had little prior experience with microcomputers. All students were able to answer questions that required descriptive or anticipatory responses (e.g., "What are you doing?" or "What are you supposed to do next?"). Formalized assessments with the Stanford Binet and Vineland Adaptive Behavior Scales yielded an IQ equivalent of 52 and 57, respectively, for the 3 participants with disabilities. Baseline performance for the 3 participants across the eight games yielded a mean of 35.4% correct responding.

The nonhandicapped peers were 3 eighth-grade students who were participating in a peer tutor program in the special education classroom. The peers were familiar with the abilities and behaviors of the participating students with disabilities. They had been taught by the classroom teachers to implement systematic instruction, behavior management, and data collection procedures. Additionally, each peer tutor had been taught strategies to interact socially with the students. All 6 participants were members of an integrated friendship program that included 70 members with and without disabilities who spent time together in small cliques or dyads during structured and nonstructured lunch activities throughout the week.

Materials

An Apple IIGS® computer was used by all 3 dyads. Eight computer games were selected for this investigation. Four of the games were selected to be trained and four were to remain untrained. The games selected to be trained were roller skating, dig dug, surfing, and footbag. The games used as untrained probe games were slalom, cross country, soccer, and speed skating. None of the 6 participating students had previous experience with any of the computer games. The games in the trained and untrained sets were matched according to degree of difficulty (measured by the number and position of keys used and the number of different responses needed to obtain the desired outcome), manufacturer, number and clarity of visual stimuli, and number of auditory stimuli. Additionally, baseline measures of the training games indicated comparability with the untrained games in terms of both the mean percentage correct game-playing responses by the students with disabilities and the frequency of social initiations that occurred within the dyad.

Setting

Social initiation and training sessions were conducted in the special education classroom. Training of the four training games was conducted individually by the experimenter during scheduled training sessions. Training occurred three to four times per week per student for approximately 20 min per session. After completion of the training phase for all 3 participants with disabilities, social initiations around computer games with nonhandicapped peers were observed during breaks between instructional activities or while waiting for class periods to end. During these breaks, the classroom teacher asked the students to play a microcomputer game. The dyad sat at the computer and the investigator sat approximately 1.5 m behind the dyad at a table where she recorded interactions for 10 min through continuous data recording. Directly to the right of the computer, a videocamera recorded the interactions of the dyad. The camera was turned on when the dyad began playing the game and was turned off at the end of the 10-min recording session. Videotapes were used for computation of reliability estimates only.

Procedure

Four preselected computer games were taught to each of the 3 students with disabilities following baseline measurements of (a) initiations while playing designated training games and (b) the students' performance on task analyses from each of the four games. Task analyses were developed that contained six steps: (a) student identifies the buttons to use in play, (b) student uses buttons correctly in play, (c) student identifies the objectives of the game, (d) student plays to achieve the objectives of the game, (e) student identifies the score, and (f) student identifies the high score. The responses specific to each step varied across games in both

the nature and number of responses needed. Students were required to identify, through both verbal description and performance criterion, the procedures to play, the purposes, and the outcomes of each game. Following training of four of the eight games, probes for social initiation when playing each of the eight games were conducted.

Social initiation baseline. Prior to the introduction of game-playing instruction across the four computer games, baseline probes were conducted that assessed the frequency of initiations within each dyad while students were playing the four training games. Four baseline probes were conducted, one for each of the four games.

During the scheduled break between activities, the dyad was asked to play a specific computer game. The game had been loaded and was ready for play. The directions for play were written on index cards and were attached to the base of the computer. No additional instructions, prompts, or feedback were given by the investigator for the duration of the session. Play continued for 10 min.

Typical interactions that occur around microcomputer games are brief verbal or gestural exchanges that direct self or other performance, comment on self or other performance, or are unrelated to the game. Extended (i.e., multiple turn) interactions are seen infrequently during play around computer games; instead, interactions are typically one to two turns in length and consist of an initiation plus a response, occasionally followed by a second related comment or directive. For the purposes of this research, therefore, we were interested in examining the frequency of these brief exchanges as a measure of engagement, with the initiation being the most critical element of the interaction. A measurement system validated in a prior investigation (Haring, Breen, Weiner, & Bernstein, 1990) was used to code the interaction patterns of the dyad. Initiation data were recorded continuously during the 10-min observation period.

An initiation was defined as any behavior, verbal or nonverbal, that began an interaction. A new initiation was coded if there was a change in topic or a mutual break in focus followed by a refocusing of attention. Initiations were coded to indicate the identity of the initiation (student with disabilities or peer), and whether the initiation was defined as social or teaching. A *teaching initiation* was defined as any behavior that attempted to alter another's performance on the game. *Social initiations* included comments on the game, comments on the performance of the student or the peer, or social comments unrelated to game playing.

Game-playing baseline. Following baseline assessments of social initiation within the dyad, baselines were conducted to assess the performance of each student with disabilities when playing these same games. Each of the four computer games was loaded and ready for play. To assess the student's ability to describe verbally the rules of the game, an investigator asked the student to identify which keys to use to play the game and the purposes of the game (e.g., "What are you supposed to do here?"). To assess the student's ability to use the game, the student was then asked to play. The investigator assessed whether the appropriate keys were used and whether the student made motor responses to computer-generated visual stimuli that facilitated achieving the purposes of the game (e.g., when playing footbag, in the presence of the ball, the student hits the ball up in the air instead of standing still or running away). Following completion of the game, the student was asked to say the score. Finally, the student was shown two scores written on a piece of paper and was asked to say the high score. No prompts, corrections, feedback, or reinforcers were given to the student during baseline conditions.

Training. Following baseline measurements, game-playing instruction on one of the games was begun. Training continued until the student played the game for three consecutive sessions with 100% accuracy (defined as competent game-playing behavior). Following the attainment of criterion, instruction was conducted on the second game until criterion performance was demonstrated, followed by training of Games 3 and 4. During training sessions, the student was given the same verbal cues to say the rules of the game as provided under baseline conditions. If the student did not respond within 5 s or responded incorrectly to questions that

required a verbal or a pointing response, the instructor verbally modeled the correct answer and asked the student to repeat this response. If the student did not use the correct keys or made responses that did not accurately respond to visual stimuli, the instructor introduced a hierarchy of corrective prompts that included (a) an indirect verbal prompt (e.g., "What are you supposed to do?" or "What key are you supposed to use?"), (b) a direct verbal prompt (e.g., "Make her skate in the middle. Push the 'L' key."), and (c) a gestural prompt as needed for the final level in the prompt hierarchy. Verbal praise was given following each correct verbal and performance response until the student had achieved at least 80% accuracy in playing the game, at which point praise was delivered contingent on the production of an average of three consecutive responses.

Posttraining. Following attainment of criterion on the four games, a posttraining assessment was conducted measuring student performance when playing the four trained games as well as the four untrained games. One posttraining probe was conducted for each of the eight games. Posttraining probes followed the same procedures as used under baseline conditions.

Social initiation probes. After the posttraining probes were conducted across all eight games, probes of social initiation when playing the games were begun with nonhandicapped peers. A total of 12 probes were conducted for each dyad, consisting of eight probes of trained games and four probes of untrained games. The final four trained probes were conducted directly following the completion of the probe phase of the study to assess the maintenance of the effects of competent behavior by the student with disabilities on subsequent social interaction. For one dyad, social initiation probes occurred daily. For the second dyad, probes were conducted four times per week, and for the remaining dyad, probes were conducted twice per week. For all eight games, the procedures to conduct a probe session and measurements used to code initiations were identical to those used under social initiation baseline conditions.

Satisfaction measures. During the social initiation probe phase, a second measure was included to assess the satisfaction of the students. Following completion of a session, each member of the dyad was given a questionnaire regarding the previous 10-min session. The students completed the questionnaire while seated on opposite sides of the classroom. The nonhandicapped peers completed their forms without assistance from the instructor. The students with disabilities were given assistance by the instructor in reading the questions but were given no assistance or prompting in responding to the questions. Two questions were asked on the questionnaire: Did you like the game (yes or no)? How much did you like being with your friend (none, some, or a lot)? To scale these responses, "No" received a score of 0 and "Yes" a score of 1. "None" received a score of 0, "Some" received a score of 1, and "A lot" received a score of 2. To display the results of the satisfaction measures, the percentage of games receiving each score per question was determined and presented for both the trained and the untrained games.

Experimental Design

A multiple baseline across participants design was used to assess the effectiveness of the training phase (for instruction of the first game only). The order of games trained was reversed for Students 2 and 3 in order to partially control for potential order effects. The independent and dependent variables for this phase were game training and subsequent game-playing behaviors, respectively.

Following training, an alternating treatments design was used to assess the effects of training on social initiations and satisfaction. During this phase, probes with trained and untrained games were alternated. Following one probe across each of the eight games, probes were repeated once for each of the trained games to demonstrate maintenance of effects. The independent and dependent variables for this phase were competent game-playing behaviors and social initiation and participant satisfaction, respectively.

Reliability

Measures of reliability were taken during both training and probe phases. During the training phase, interobserver agreement checks were con-

ducted every fifth session for all 3 participants. The percentage of interobserver agreement was calculated according to the point-by-point correspondence method (Kazdin, 1982). Interobserver agreement data were collected across both baseline and intervention resulting in 100% agreement for each session. Interobserver agreement checks were also taken during the probe phase. Reliability measures were scored from videotapes of the corresponding session such that a total of four sessions per dyad were assessed for reliability (two trained games and two untrained games). Measures were recorded from continuous play of the videotape (rather than through interval recording) to best approximate conditions found during direct observations. Agreement checks were taken on the overall frequency of initiations (M = 89.6%; range, 80% to 100%), the direction of initiation (M = 88%; range, 60% to 100%), and the type of initiation (i.e., social vs. teaching) (M = 84.7%; range, 79% to 100%).

RESULTS

Training

Figure 1 shows the data gathered during the training phase of the study. For Larry (top panel), baseline measurements were taken for each of the four designated training games, and a mean performance of 39.7% correct was observed. When training was begun on the first game (surfing), there was an immediate improvement in performance with attainment of criterion after five training sessions. Training on Games 2 (footbag), 3 (roller skating), and 4 (dig dug) was similarly rapid. Larry met the criteria for all four games after 27 sessions of instruction. For both Holly (middle panel) and Crystal (bottom panel), training also resulted in rapid acquisition of the game-playing skills. Holly required 39 instructional sessions, and Crystal required 38 sessions for all four games. Next, posttraining probes were conducted across the four trained games, and baseline probes were taken of the four untrained games. All 3 students were able to play the four training games with 100% accuracy. Performance on the untrained games showed a mean performance of 39% correct responding for Larry, 34.2% for Holly, and 31% for Crystal.

Social Initiation Measures

Results for the three dyads are shown in Figure 2. Larry and Tom (his nondisabled peer) are shown in the top two panels. Baseline measures for Games 1 through 4 indicate means of 2.5 and 7.5 social initiations for Larry and Tom, respectively. Following game training, Larry's data indicate a mean of 19.25 social initiations for trained games and 5.5 social initiations for untrained games. Tom demonstrated a mean of 29.75 social initiations for trained games and 16.0 social initiations for untrained games.

Baseline measures for Holly and Judy (middle two panels) across the four trained games show a mean of 2.5 social initiations for Holly and 4.75 for Judy. Following game training, Holly demonstrated a mean of 14.75 social initiations when playing trained games and a mean of 6.25 when playing untrained games. Following training, Judy showed a mean of 4.5 social initiations when playing trained games and 4.25 when playing untrained games.

The frequency of social initiations for training games during baseline for Crystal and Paula (bottom two panels) was a mean of 1.5 and 0.5, respectively. Following game training, Crystal and Paula demonstrated a mean of 10.25 and 14.0 social initiations, respectively, when playing trained games, and a mean of 1.75 and 5.25 social initiations, respectively, when playing games that had not been trained.

In summary, across the 3 students with disabilities, there was a consistent difference between sessions when students were engaged in games that had been trained and games that had not been trained (this is demonstrated both in the comparison of the same set of games pre- and posttraining and the comparison of the two sets of games, one of which had been trained and one of which had not been trained). For all 3 participants with disabilities, there were substantially greater levels of social initiation when they played trained games. In addition, the maintenance data for the students with disabilities indicate that this level of performance continued at similarly high levels. For the 3 nondisabled peers, 2 also showed higher levels

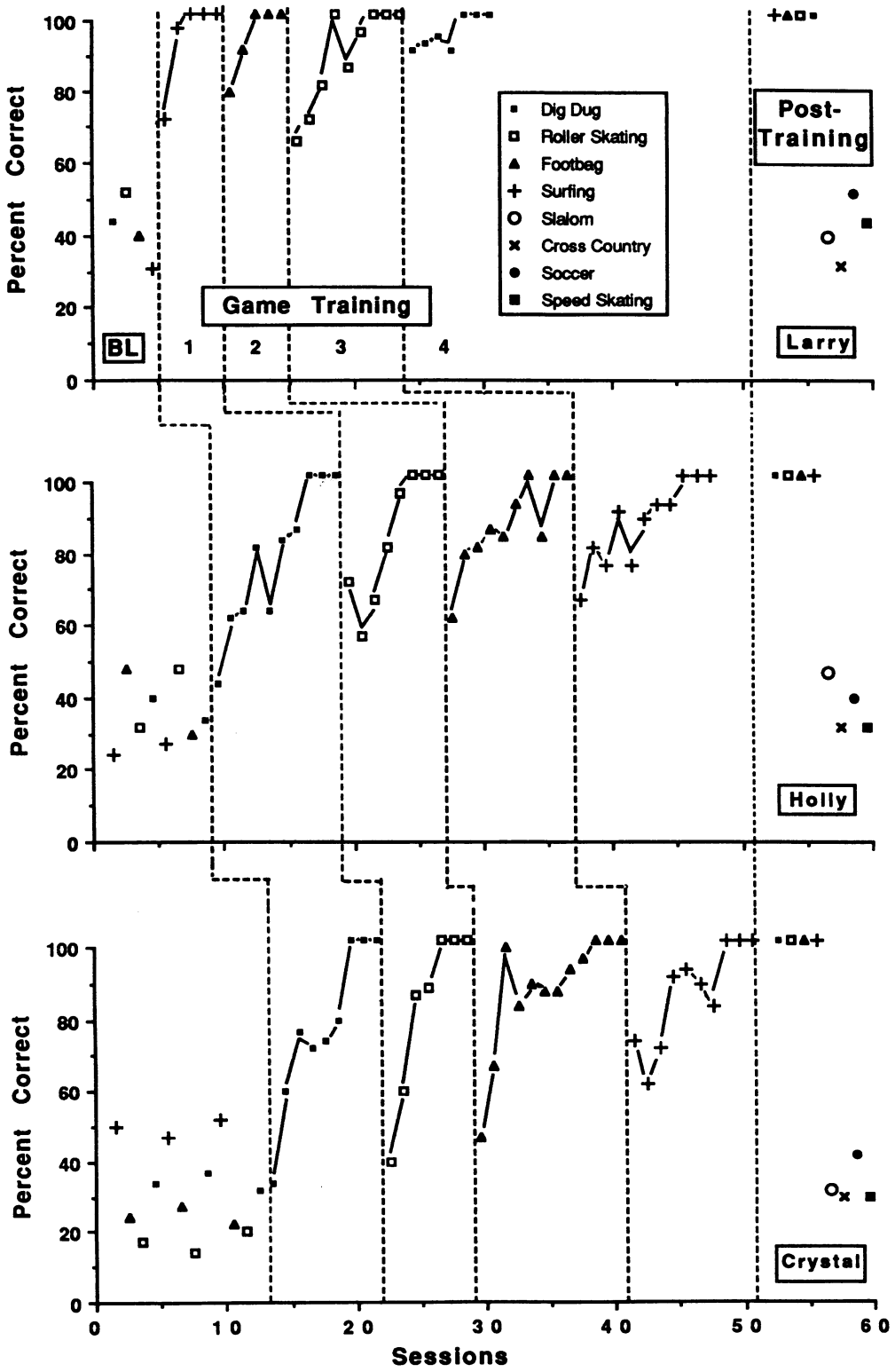

Figure 1. Percentage of correct responding across eight trained and untrained computer games for Larry, Holly, and Crystal.

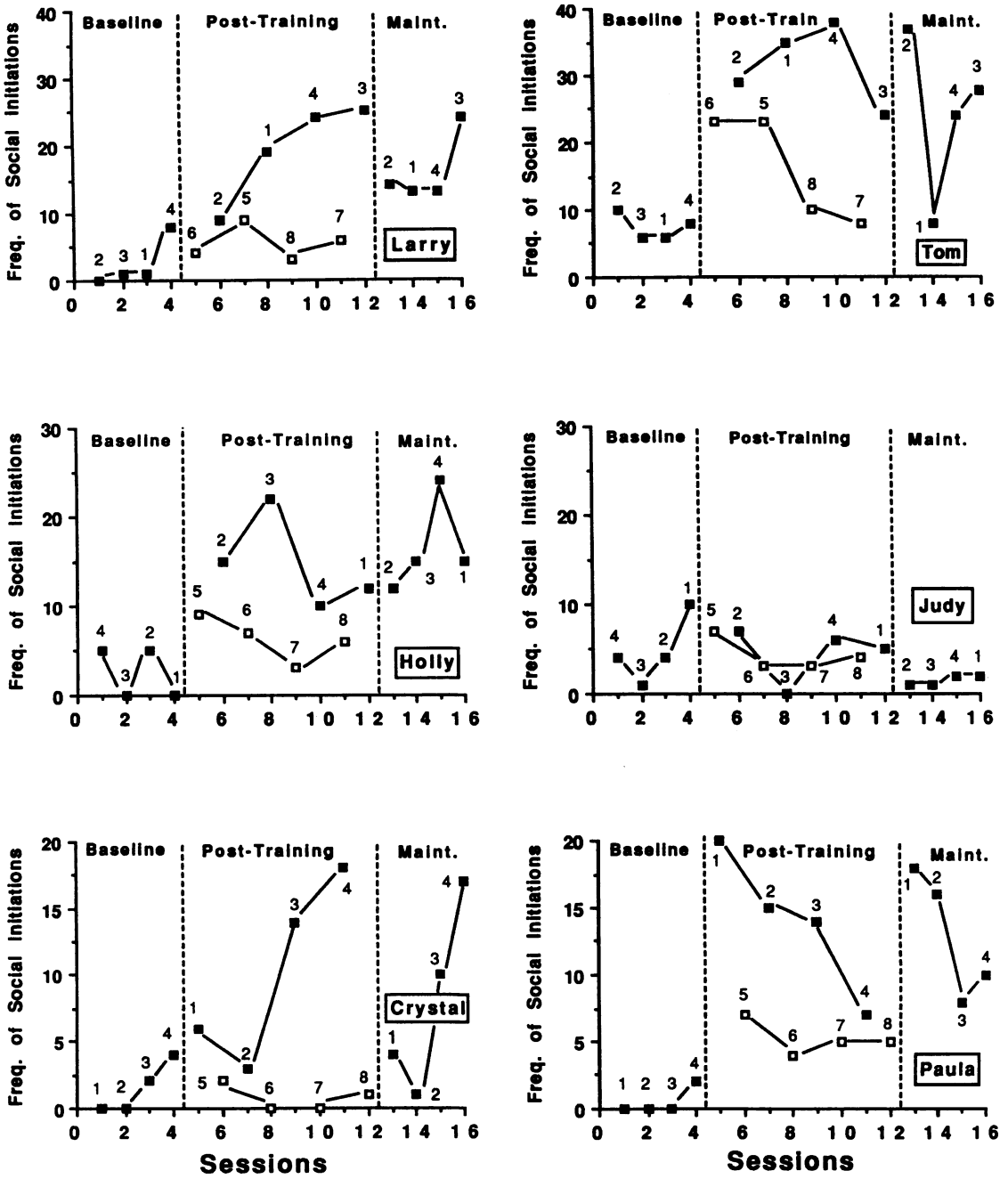

Figure 2. Frequency of social initiations while playing trained (closed data points) and untrained computer games (open data points) for the three dyads. The data points are numbered 1 through 8 to indicate which game was probed for each session. Game 1 was footbag, Game 2 was roller skating, Game 3 was surfing, Game 4 was dig dug, Game 5 was soccer, Game 6 was cross country, Game 7 was slalom, and Game 8 was speed skating.

of social initiations when the students with disabilities demonstrated competence in playing the games. A summary of the mean levels of teaching and social initiations is given in Table 1. Two of the 3 peers (Judy and Tom) produced a substantially greater mean level of teaching initiations when their peers were not able to play the games than when they were. In addition, the overall level of initiation

Table 1
Mean Frequency of Initiations

	Baseline (Set 1)	Trained (Set 1)	Untrained (Set 2)
Students with disabilities			
Crystal			
Social initiations	1.5	10.25	1.75
Teaching initiations	2.05	0.50	0.75
Holly			
Social initiations	2.5	14.75	6.25
Teaching initiations	2.5	0.25	1.25
Larry			
Social initiations	2.0	19.25	5.5
Teaching initiations	4.75	1.0	2.75
Peers			
Paula			
Social initiations	0.50	14.0	5.25
Teaching initiations	1.5	4.50	2.75
Judy			
Social initiations	4.75	4.50	4.25
Teaching initiations	7.75	0.75	7.75
Tom			
Social initiations	7.5	29.75	16.0
Teaching initiations	11.0	1.50	8.0
Total initiations (peers plus students with disabilities)			
Crystal and Paula	7.25	29.25	10.50
Holly and Judy	17.5	20.25	19.50
Larry and Tom	25.5	51.50	32.50

(the sum of teaching and social initiations across both members of the dyad) was substantially greater for two of the three dyads when the student with disabilities had been trained to play the games. Although Judy's social initiations were not appreciably different between the two sets of games or between baseline and posttraining conditions for Game Set 1, there was a substantial difference in the frequency of Judy's teaching initiations between trained and untrained games (0.75 vs. 7.75).

Satisfaction Measures

Student and peer satisfaction data are given in Figure 3. For 5 of the 6 students, greater levels of satisfaction occurred when playing trained games than when playing untrained games. There was no difference in assignment of game enjoyment between trained and untrained games for Holly (middle two panels). For 3 of the 6 students, (Tom, Holly, and Paula), more frequent nominations of liking being with their friend "a lot" were made when playing trained games. Larry's data (top two panels) indicate that he liked being with his peer "a lot" no matter what game was being played. Judy's data (middle two panels) indicate that she had slightly more positive nominations of being with her peer when playing untrained games than when playing trained games. Crystal's data (bottom two panels) indicate that she liked being with her peer "some" during all games played.

DISCUSSION

Our results have some important implications for the structuring of integration activities for students with moderate and severe disabilities. Specifically, these data argue that successful social integration (defined here as positive social initiations and positive satisfaction ratings) is facilitated by increased skill levels of students with disabilities in

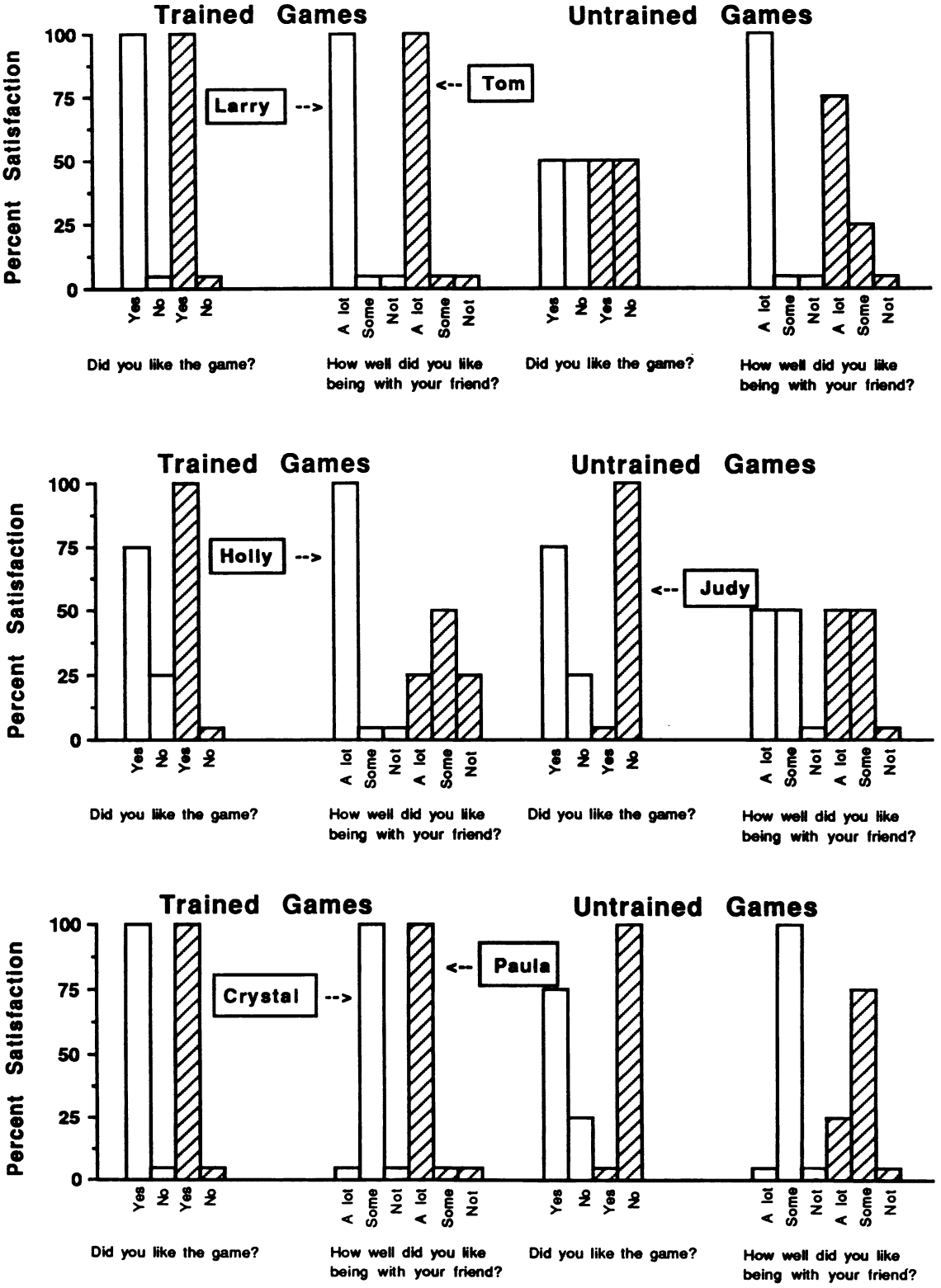

Figure 3. Rating of satisfaction for the three dyads following engagement with trained and untrained games. Open bars represent data for the student with disabilities, and the striated bars depict results for the nondisabled peer.

these contexts. Accurate responding in a social context appears to play a role in changing the balance of interactions from a heavier reliance on initiations from the nonhandicapped peers to one of more equal social participation and mutual enjoyment. In the present data, the students with disabilities initiated 42% of the interactions with trained games, whereas with untrained games, they initiated only 29% of the interactions. Further research in areas other than social interaction contexts is needed in order to make more general instructional recommendations.

In replicating or extending this research, a modification that should be made to strengthen the interpretation of the outcome measures is to assign the games randomly to either trained or untrained sets so that each participant is exposed to a different set of trained and untrained games. Although social initiation baseline measures and performance baseline measures were comparable for the two sets of games on measures of game-playing responses and indicated slightly higher levels of social initiation for the designated untrained games for 4 of 6 participants, there is still a possibility that increased levels of social initiation and satisfaction were affected by something inherently more enjoyable in the set of trained games.

A second potential limitation regarding the interpretability of these findings is that the analysis was conducted in the context of a social relationship that already existed between the students with disabilities and their peers. We are unable to make any conclusions from these data regarding interactions that might occur between individuals who did not have a previous social or instructional history. Further research is needed to separate the effects of previous peer training on subsequent dyadic interactions, particularly the effects of peer tutoring experiences on the levels of teaching initiations that occur in novel or untrained contexts. In these data, it is possible that differences in outcome levels for Judy (peer without disabilities) may have been the result of previous training as a peer tutor. Judy demonstrated low levels of social initiation across both trained and untrained games (anecdotal reports from classroom teachers indicated that Judy's level of social initiation with peers and teachers was low for all activities in the classroom), and she showed higher levels of teaching initiation when playing games that had not been trained to her peer (see Table 1). Although Judy assigned more positive ratings of the game when playing trained than untrained games, she assigned more positive ratings to her peer when playing untrained games. In other words, Judy had greater satisfaction when playing those games she could play through modeling Holly's game-playing responses; however, she enjoyed her peer more when she could assume an instructional role.

The results of the present research point to the increased importance of analyzing social and environmental variables in the design of support programs for students with disabilities. One strength of a context-specific behavior analysis is the potential to expand the variables considered as viable for technological development. Contextual behavior analysis provides a framework for reassessing theoretical systems that posit a broader set of variables than does the stimulus–response–consequence model (Kantor, 1958). Variables such as the social roles individuals play in a setting, the characteristics of the setting itself, and the efficacy or competence of responses in achieving goals in a setting should be analyzed in this framework. In the present research, one such variable, increases in effectiveness within the context, was shown to have effects on both social initiations and satisfaction for 5 of the 6 participants.

A sizeable proportion of emerging research in the areas of task analysis, problem behaviors, social relationships, and the social validity of behavior is highly context specific. For example, Haring and Kennedy (1990) showed that problematic stereotypic behavior (e.g., body rocking), although topographically the same in two different contexts, served different functions depending upon the context in which it occurred (e.g., escaping from instruction or providing self-stimulation during leisure). Similarly, studies conducted from a ecobehavioral perspective (e.g., Greenwood et al., 1984; Tertinger, Greene, & Lutzger, 1984) also demonstrated that characteristics of the setting, as

well as the behavior of the individual, can be changed to obtain desired outcomes. A context-specific behavior analysis warrants further development and analysis as a future foundation upon which to develop support technologies.

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Received April 5, 1990
Initial editorial decision June 1, 1990
Revisions received July 25, 1990; October 22, 1990; December 5, 1990
Final acceptance February 8, 1991
Action Editor, David P. Wacker